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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 09/911,912 | 07/24/2001 | Kevin J. Youngers | 1016754-1 | 4201 |

7590 02/16/2005

HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Port Collins, CO 80527-2400

| EXAMINER | |
|---|---|
| LAROSE, COLIN M | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2623 | |

DATE MAILED: 02/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/911,912 | YOUNGERS, KEVIN J. | |
| | Examiner | Art Unit | |
| | Colin M. LaRose | 2623 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *01 November 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☒ Claim(s) *19* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Arguments and Amendments*

1. Applicant's amendments and arguments filed 1 November 2004, have been entered and made of record.

### *Response to Arguments*

2. Regarding claim 13, Applicant argues (see p. 8-9 of Remarks) that there is no motivation to combine Farnung with Kishida. However, as previously explained, Kishida teaches forming different tone curves for different regions of an image and then combining the curves to form an overall tone curve with an interpolated midrange. One skilled in the art would have been motivated to utilize Kishida's technique in order to generate a tone curve for the overall image that incorporates the desired tone corrections of various image regions. See the explanation for claim 13 below.

### *Claim Objections*

3. In view of Applicant's amendments, the previous claim objection of claim 18 is withdrawn.

4. The following sections of 37 CFR §1.75(a) and (d)(1) are the basis of the following objection:

> (a) The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.
>
> (d)(1) The claim or claims must conform to the invention as set forth in the remainder of the specification and the terms and phrases used in the

> claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description.

5. Claims 8, 10, and 11 are objected to under 37 CFR §1.75(a) and (d)(1) as failing to particularly point out and distinctly claim the subject matter that the applicant regards as the invention.

Regarding claim 8, it is unclear to what "a different threshold" encompasses since claim 5, from which claim 8 indirectly depends, was amended utilize at least two thresholds rather than only one. Correction is required.

Regarding claims 10 and 11, it is unclear to what "the threshold" refers since claim 5, from which claims 10 and 11 depend, was amended utilize at least two thresholds rather than only one. Correction is required.

### *Claim Rejections - 35 USC § 102*

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 5-9 are rejected under 35 U.S.C. 102(e) as being anticipated U.S. Patent 6,753,987 by Farnung et al. ("Farnung").

Regarding claim 5, Farnung discloses a method of processing color image data contained in an array of pixels, comprising:

selecting at least two thresholds (figure 13: lower offset and upper offset);

(a) reading a color component of a pixel (i.e. L* input values are read);

(b) transforming the color component of the pixel with a tone map when the color component of the pixel is greater than one of the at least two thresholds (i.e. when L* is greater than the lower offset, L* is transformed by the tone map), and preserving the color component when the color component of the pixel is less than another of the at least two thresholds (i.e. when L* is less than the upper offset, the color component is preserved – that is, the tone map is unity in the region below the upper offset, so the L* value is not changed). Farnung does not disclose "otherwise modifying ... to smooth," as claimed, since the value of L* is always either above the lower offset or below the upper offset (or both). Farnung is considered to anticipate the claim because the "otherwise modifying" limitation is not required to be performed.

Regarding claim 6, Farnung discloses repeating steps (a) and (b) for essentially each pixel in the array (i.e. the characteristic curve for figure 13 is applied to every pixel in the image).

Regarding claim 7, Farnung teaches that steps (a) through (b) are repeated to create a new output color component for each of the color components in the color image (i.e. the characteristic curve for figure 13 is applied to every L* color component in the image).

Regarding claim 8, Farnung teaches that the thresholds are different for each color component (i.e. lower offset is different from upper offset).

Regarding claim 9, Farnung discloses different tone maps for creating each output color component in the color image (see e.g. figures 5-7).

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,753,987 by Farnung et al. ("Farnung").

Regarding claims 10 and 11, Farnung does not expressly disclose the claimed values as the thresholds. However, since Farnung allows the threshold values to be specified as any value, those skilled in the art would have known to set the threshold to a certain value according to design specifications or performance criteria. Since the claimed threshold values appear correspond to design and implementation criteria, and since they do not appear to be critical inventive steps or lend to unexpected results, they are deemed to be an obvious feature to those skilled in the art.

10. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,215,529 by Sugimoto et al. ("Sugimoto") in view of U.S. Patent 5,959,693 by Wu et al. (Wu").

Regarding claim 1, Sugimoto discloses a method (figure 5) of processing color image data, comprising:

(a) examining a color component of a pixel in the image (figure 5: an input value of the R-Y color component is "examined");

(b) selectively applying a tone map to the color component of the pixel to create an output color component only when the color component is not in a dark area of the image (figure 5: if the R-Y color component is below the Lb value (i.e. "in a dark area"), the value is passed without change, since the gradient of the tone curve is one in the dark region; otherwise, tone mapping is applied, and the (R-Y) color component value is modified according to the tone curve above the Lb threshold).

Sugimoto does not disclose (c) selectively blending the transition between pixels in the image.

Wu discloses an image processing system (figure 1) whereby pixels in the image are adaptively low-pass filtered. As shown in figures 2 and 4, for each color component in the image, a kernel smoothing filter is selected and executed in order to blend the transitions between pixels.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Sugimoto by Wu to selectively blend the transitions between pixels, as claimed, since Wu discloses that it is desirable to reduce the noise in an image, and reducing noise is advantageously accomplished by selectively blending transitions between pixels so that noise is reduced while image sharpness is maintained. Column 1, line 61 through column 2, lines 22.

Regarding claim 2, Sugimoto discloses repeating steps (a) and (b) for essentially each pixel in the image (i.e. the characteristic curve for figure 5 is applied to every pixel in the image).

Regarding claim 3, Sugimoto discloses blending the transition between pixels in the image that are in a dark area and pixels in the image that are not in a dark area (figure 5: the transition region between Lb and Lc is a blend of the dark and light region curves).

Regarding claim 4, Sugimoto discloses the tone map is using a gamma correction curve (i.e. figure 5 is a gamma correction curve).

11. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,481,317 by Hieda in view of U.S. Patent 6,215,529 by Sugimoto et al. ("Sugimoto") and U.S. Patent 5,959,693 by Wu et al. ("Wu").

Regarding claims 17 and 18, Hieda discloses a camera, comprising:

a photo sensor and a lens system that forms an image on the photo sensor (camera 1, figure 1);

a tone map for mapping image data (gamma corrector 13, figure 1).

Hieda does not disclose that the image data is mapped only when it exceeds a predetermined value. As shown in figure 3, when the input value is less than the threshold $x_1$, the output value is equal to four times the input value.

Sugimoto discloses a gamma compensation curve (figure 5) similar to that of Hieda. Sugimoto discloses that when the input value is less that a threshold (Lb), the output value is equal to the input value. This is equivalent to the gamma correction curve not being applied to the input value, since the input value is simply passed without change.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Hieda by Sugimoto to map the image data only when the image data exceeds a predetermined value, since Sugimoto shows that correcting only input values of a color component signal above a certain threshold achieves desirable color correction.

Neither Sugimoto nor Hieda disclose blending transitions in the image data, as claimed.

Wu discloses an image processing system (figure 1) whereby pixels in the image are adaptively low-pass filtered. As shown in figures 2 and 4, for each color component in the image, a kernel smoothing filter is selected and executed in order to blend the transitions between pixels.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Hieda and Sugimoto by Wu to selectively blend the transitions between pixels, as claimed, since Wu discloses that it is desirable to reduce the noise in an image, and reducing noise is advantageously accomplished by selectively blending transitions between pixels so that noise is reduced, but image sharpness is maintained. Column 1, line 61 through column 2, lines 22.

12. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,753,987 by Farnung et al. ("Farnung") in view of U.S. Patent 5,287,418 by Kishida and U.S. Patent 5,481,317 by Hieda.

Regarding claim 12, Farnung discloses a scanner (column 3, lines 62-64: scanner 100 and image processor 400, embodied in a photocopier, constitute a scanning device), comprising:

a tone map for transforming the raw digital data into corrected digital data (figure 13);

the scanner configured:

to output the raw digital data when the raw digital data is below a first pre-selected threshold (i.e. when the L* IN value is below the lower offset 730, the tone map preserves its value; see column 8, lines 46-54: the tone mapping is 1:1 in the lower region),

to output the corrected digital data when the raw digital data is greater than a second pre-selected value (i.e. when the L* IN value is above the upper offset 740, then the tone map in the upper region is applied) and

to output digital data that is modified when the raw digital data is between the two thresholds (i.e. the color component is modified according the tone map in the mid-range region when the L* IN value is between the upper and lower offsets).

Farnung is silent to modifying the mid-range by interpolation, as claimed.

Kishida discloses a method of tone conversion of image data, similar to that of Farnung, wherein an input value is mapped to a corresponding output value via a gradation conversion curve (see figure 3). In particular, Kishida discloses that two different tone curves, $f_1$ and $f_2$, are created for different image regions, $R_1$ and $R_2$, as shown in figure 5. For the purposes of deriving a tone mapping, the two tone curves for the respective regions are blended to form a resulting tone curve, $f_d$. As can be seen in figure 3, the output of the mid-range densities is generated according to the composite $f_d$ curve, which is an interpolation of the $f_1$ and $f_2$ curves. Therefore, the output of the mid-range densities is essentially an interpolation of the tone curves $f_1$ and $f_2$.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Farnung by Kishida to modify the color components in the mid-range by interpolation, since Kishida discloses that a composite tone curve that interpolates density values for the mid-

range region allows the desired contributions of regional tone curves to be selected for application to the overall tone curve (column 2, lines 13-22).

Farnung also does not disclose a photo-sensor array and an A/D converter, as claimed.

Hieda discloses an image pick-up apparatus that includes a photo-sensor array for converting an image into an electrical signal (camera 1); and an A-to-D converter to convert the electrical signal into raw digital data (A/D 3).

It would have been obvious to modify Farnung by Hieda to include a photo-sensor array and an A/D converter in the scanner, since Hieda discloses that image pick-up devices conventionally comprise a photo-sensor and an A/D converter so that a digital image can be obtained.

13. Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,753,987 by Farnung et al. ("Farnung") in view of U.S. Patent 5,287,418 by Kishida.

Regarding claim 13, Farnung discloses a method (see figure 13) of processing data contained in an array of pixels, comprising:

defining a threshold (midpoint 710);

defining a range around the threshold, the range having a top end (upper offset 740) and a bottom end (lower offset 730);

defining a tone map (i.e. figure 13 shows a tone map);

(a) reading a color component of a pixel (i.e. the input L* component ("L* IN") is read and transformed according to the tone map);

(b) applying the tone map to the color component when the color component is above the top of the high end (i.e. when the L* IN value is above the upper offset 740, then the tone map in the upper region is applied);

(c) modifying the color component when the color component is below the top end of the high range and above the bottom end of the low range (i.e. the color component is modified according the tone map in the mid-range region when the L* IN value is between the upper and lower offsets); and

(d) otherwise preserving the color component (i.e. when the L* IN value is below the lower offset 730, the tone map preserves its value; see column 8, lines 46-54: the tone mapping is 1:1 in the lower region).

Farnung is silent to modifying the mid-range by interpolation, as claimed.

Kishida discloses a method of tone conversion of image data, similar to that of Farnung, wherein an input value is mapped to a corresponding output value via a gradation conversion curve (see figure 3). In particular, Kishida discloses that two different tone curves, $f_1$ and $f_2$, are created for different image regions, $R_1$ and $R_2$, as shown in figure 5. For the purposes of deriving a tone mapping, the two tone curves for the respective regions are blended to form a resulting tone curve, $f_d$. As can be seen in figure 3, the output of the mid-range densities is generated according to the composite $f_d$ curve, which is an interpolation of the $f_1$ and $f_2$ curves. Therefore, the output of the mid-range densities is essentially an interpolation of the tone curves $f_1$ and $f_2$.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Farnung by Kishida to modify the color components in the mid-range by interpolation, since Kishida discloses that a composite tone curve that interpolates density values for the mid-

range region allows the desired contributions of regional tone curves to be selected for application to the overall tone curve (column 2, lines 13-22).

Regarding claim 14, Farnung discloses repeating the steps for every pixel in the array (i.e. the tone map is applied to every pixel in the image).

Regarding claim 15, Farnung does discloses applying the tone curve to only the L* color component, however, Kishida discloses applying the tone curves to each of the color components in the image (column 4, lines 38-41). This provides more versatility in tone correction since each color component is individually corrected.

14. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,753,987 by Farnung et al. ("Farnung") in view of U.S. Patent 5,287,418 by Kishida, as applied to claim 14 above, and further in view of U.S. Patent 6,636,229 by Ishikawa et al. ("Ishikawa").

Regarding claim 16, Farnung and Kishida do not disclose that a different threshold is used to create each output color component in the color image. It appears that in both systems, the same thresholds are used for all color components.

Ishikawa teaches a system that corrects color signals according to a characteristic curve such as shown in figure 2. Ishikawa also discloses that a characteristic curve is applied to each color component signal (figure 5) and that the parameters for each characteristic are independently set and adjusted (column 4, lines 53-59: the parameters a, b, c, d, A, B, and C are set for each of the correction circuits in figure 5).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Farnung by Ishikawa so that the thresholds for each of the color components are

different, since Ishikawa teaches that the threshold (i.e. break point "A"), as well as the other curve parameters, are set so that they conform to the different correction characteristics of each of the color components and thereby produce a more effective correction of the image signal (column 8, lines 26-36).

***Allowable Subject Matter***

15. Claim 5 would be allowable if it were amended to denote that the threshold used in association with the tone map is greater than threshold used for the preservation. This would preclude an interpretation of the claim presented above, wherein there is no midrange whereby smoothing of transitions is effected. Farnung, nor any of the other cited prior art, disclose the situation where a color component "C" is:

- tone mapped if C > a first threshold
- preserved if C < a second threshold
- modified to smooth transitions between adjacent pixels when C is in between the first and second thresholds, and
- first threshold > second threshold.

16. Claim 19 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claim 19, Kishida teaches modifying the mid-range values via an interpolated tone map. Kishida does not disclose that the interpolation is between the color component value

and a value generated by the tone map. Rather, the color component value is replaced by an interpolated tone map value, so Kishida's interpolation is between tone map values and not between a color component value and a tone map value.

***Conclusion***

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colin M. LaRose whose telephone number is (703) 306-3489. The examiner can normally be reached Monday through Thursday from 8:00 to 5:30. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au, can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the TC 2600 Customer Service Office whose telephone number is (703) 306-0377.

VIKKRAM BALI
PRIMARY EXAMINER

CML
Group Art Unit 2623
9 February 2004